ORIGINAL

BEFORE THE

Federal Communications Commission

WASHINGTON, DC

In the Matter of:	)	
	)	
Amendment of Part 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements	)	IB Docket No. 99-67
	)	
Petition of the National Telecommunications And Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band	)	RM No. 9165

To: The Commission

COMMENTS
OF NORCOM NETWORKS CORPORATION

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NORCOM NETWORKS CORPORATION

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Its Attorneys

Dated: June 21, 1999

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1610-1660.5 MHz Band	)	

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I. INTRODUCTION

Norcom Networks Corporation ("Norcom"),[1] by its attorneys and pursuant to Section 1.415 of the rules of the Federal Communications Commission ("FCC" or "Commission"),[2]

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[1] Norcom owns and operates a ground-based data transport system that provides value-added packet data mobile-satellite service ("MSS") in the United States in conjunction with the AMSC-1 satellite, which is owned and operated by American Mobile-Satellite Corporation ("AMSC"). See Establishing Rules and Policies for the Use of Spectrum for Mobile-Satellite Service in the Upper and Lower L-band, *Notice of Proposed Rulemaking,* 11 FCC Rcd 11675 (1996); see also AMSC Licensing Order, 4 FCC Rcd 6041 (1989), *Final Decision on Remand,* 7 FCC Rcd 266 (1992); *aff'd sub nom.*, Aeronautical Radio, Inc. v. FCC, 983 F.2d 75 (1993). For the purpose of providing this service, Norcom holds a blanket authorization to operate up to 200,000 mobile earth terminals in the L-band frequencies 1545-1599 MHz (receive) and 1646.5-1660.5 MHz (transmit). FCC File No. 371-DSE-P/L-96, Call Sign E960126.

[2] 47 C.F.R. § 1.415.

hereby submits these Comments on the notice of proposed rulemaking ("NPRM") released by the Commission on March 5, 1999.[3] In its NPRM, the Commission proposed to adopt out-of-band emissions limits for the 1580.42-1605 MHz band to protect the Russian Federation's Global Navigation Satellite System ("GLONASS"), a 24 satellite global radionavigation system maintained by the Russian Ministry of Defense.[4] The National Telecommunications and Information Administration ("NTIA") proposed the limits, which would apply to Mobile-Satellite Service ("MSS") mobile earth terminals ("METs") operating in the 1610-1660.5 MHz band, in a petition for rulemaking ("Petition") filed with the Commission in 1997.[5]

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[3] Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements; Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Bands, *Notice of Proposed Rulemaking*, IB Docket No. 99-67, RM No. 9165, FCC 99-37 (rel. March 5, 1999), *Erratum*, IB Docket No. 99-67, RM No. 9165 (rel. April 29, 1999) (extending deadline for filing comments to June 21, 1999 to comply with the 75-day comment period required by the North American Free Trade Agreement) ("NPRM"). See also International Action: FCC Proposes Steps to Implement "GMPCS-MOU", Facilitating Deployment of New Global Mobile Satellite Interference to Radionavigation Services, *News*, IB Docket No. 99-67, Report No. 99-9 (rel. Feb. 25, 1999).

[4] GLONASS currently operates on frequencies between 1602 and 1616 MHz. However, at the request of the United States, the Russian Federation agreed to migrate GLONASS to spectrum below 1606 MHz by 2006 to prevent interference between GLONASS and the Big LEO satellite systems licensed by the United States. See NPRM, ¶ 47-48.

[5] See letter of September 18, 1997 from Mr. Richard D. Parlow, Associate Administrator for Spectrum Management, NTIA, to Ms. Regina M. Keeney, Chief of the International Bureau of the FCC; see also Office of Public Affairs Reference Operations Division Petitions for Rulemaking Filed, *Public Notice*, Report No. 2227 (rel. Sept. 23, 1997) (treating letter of Sept. 18, 1997 from NTIA to FCC as a petition for rulemaking (RM-9165) and requesting comments thereon).

The NTIA also proposed, and the Commission proposed to adopt, several other out-of-band emission limits for the 1559-1605 MHz band applicable to METs operating in the 1610-1660.5 MHz band. Besides GLONASS, these restrictions are intended to protect the NAVSTAR Global Positioning Service ("GPS"), which is operated by the United States. See NPRM, ¶¶ 61-62. As specified infra in the text, Norcom is commenting only on an emission limit intended to protect GLONASS beginning in 2005. Norcom's existing METs comply with all other proposed emission limits.

The Commission's proposed emission limit to protect GLONASS from interference is more restrictive than necessary and compliance with this proposed limit would be prohibitively expensive to Norcom and certain other licensees. If the Commission adopts the limit proposed by NTIA, Norcom and other Commission licensees may be forced to prematurely retire numerous METs. By modifying the emission limit as further described herein, the Commission can avoid prejudicing Norcom and other MSS Met licensees, while simultaneously retaining sufficient interference protection for GLONASS.

II. BACKGROUND

GLONASS and GPS are designated by the International Civil Aviation Organization ("ICAO") as the two components of a proposed single, integrated Global Navigation Satellite System ("GNSS") that would be used to determine the location of and assist to fly and land commercial aircraft. The Federal Aviation Administration ("FAA") currently permits aircraft to rely only on GPS in the United States. Nevertheless, because the FAA is investigating the possibility of eventually utilizing GNSS for aviation purposes should GNSS ever be adequately developed, in order to protect GNSS, in 1994 the FCC decided to consider adopting for MSS METs out-of-band emission limits recommended by RCTA, Inc. ("RCTA"), a non-profit corporation that functions as a Federal Advisory Committee for aviation issues.[6]

Although RCTA recommended specific out-of-band emission limits to protect GPS from interference, RCTA was unable to achieve a consensus regarding out-of-band limits to protect

[6] NPRM, ¶ 49 & n.58 (noting that RCTA's consensus-based recommendations are often used as the basis for FAA Technical Standard Orders); see also Streamlining the Commission's Rules and Regulations for Satellite Applications and Licensing Procedures, *Report and Order*, 11 FCC Rcd 21581 (1996) ("It is our understanding that the RTCA Working Group 6 is evaluating proposals for out-of-band emission limits to protect the Global Positioning System (GPS) and GLONASS components of GNSS. In our Notice, we indicated that we will propose adopting RTCA's recommendations once they are filed.")

GLONASS.[7] Instead, RCTA released two appendices to its report which presented the disparate consensus conclusions of representatives of the MSS community and representatives of the FAA and aviation community.[8] The NTIA's proposed limits, which the Commission now proposes to adopt, are based on the recommendations of the FAA and aviation community representatives in the RCTA. Specifically, for mobile earth terminals ("METs") that provide Mobile-Satellite Service ("MSS") in the 1610-1660.5 MHz band (other than Big LEO METs) and that are commissioned for use before January 1, 2002, the Commission proposes to limit out-of-band, wide-band signals in the 1585.42-1605 MHz bands to –70 dBW/MHz, and out-of-band, narrow-band signals to –80 dBW/700Hz starting January 1, 2005.[9] For the reasons set forth below, the Commission should not adopt these emission limits as proposed, but instead modify the limits as further discussed herein.

III. THE COMMISSION FAILED TO DEMONSTRATE THAT ITS PROPOSED OUT-OF-BAND EMISSION LIMITS PROVIDE THE PUBLIC WITH A BENEFIT SUFFICIENT TO OUTWEIGH THE BURDEN THE LIMITS WILL PLACE ON NORCOM AND OTHER INCUMBENT MET LICENSEES

The Commission should demonstrate that its proposed out-of-band emission limits provide a public interest benefit at least equal to the overwhelming financial burden that the proposed limits will place on Norcom and other incumbent MSS MET licensees. The

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[7] After meeting approximately 25 times between 1994 and 1997, Working Group 6 of Special Committee 159 of RCTA issued its final report regarding protection for GNSS in January 1997,. "Assessment of Radio Frequency Information Relevant to the GNSS," Document No. RTCA/DO-235 (January 27, 1997) ("WG/6, SC-159 Report").

[8] Appendix E to the WG/6, SC-159 Report ("Appendix E"), which represents the views of the MSS community, was made part of the record of RM 91-65 as an attachment to the Comments of AMSC Subsidiary Corporation (filed Dec. 8, 1997) ("AMSC Comments"). The appendix which represents the views of the FAA and aviation community has not been included in the record of this proceeding.

[9] NPRM, ¶¶ 55, 62.

Commission has failed to do so. In fact, the only technical analysis that currently is part of the record in this proceeding demonstrates that much less restrictive limits will adequately protect GLONASS. In addition, there is a significant chance that GNSS will not be sufficiently developed by 2005 for the FAA to approve the use of GLONASS for aviation purposes, and thus protection for GLONASS will not be required as soon as 2005.

Norcom's existing METs, which Norcom anticipates will remain in service beyond 2005, may not currently meet the proposed out-of-band restrictions at the band's upper edge, near 1605 MHz.[10] To assure compliance with these limits, Norcom would be required to recall and, due to manufacturing tolerances, to analyze the out-of-band emissions of each individual MET. Norcom would then be required to retrofit non-compliant METs with filtering capabilities that would add to the size and weight, and reduce the battery life of the METs. This process would be prohibitively expensive. Norcom estimates that it would cost two to three million dollars to retrofit Norcom's METs.[11] Moreover, Norcom would be able to reduce emissions in the

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[10] The out-of-band emission limits proposed by NTIA had not yet been developed when Norcom's METs were designed and manufactured. Thus, although Norcom was on notice that it may be subject to emission limits in the future, Norcom did not have an opportunity to design and manufacture MET's to comply with the unnecessarily restrictive limits proposed by NTIA.

[11] Moreover, AMSC and Comsat reported to the Commission that they also will face prohibitive retrofitting expenses to comply with this limit. AMSC asserts that AMSC may be required to replace 30,000-40,000 of its METs at a cost of up to $80 million dollars prior to the 2005 deadline. AMSC Comments, at 12-13. Comsat asserts that 25,000 Inmarsat-A METs may not satisfy the limits proposed to protect GLONASS. Comments of Comsat Corporation (filed Dec. 8, 1997) (arguing that the out-of-band emission limits proposed in RM-9165 are unnecessarily restrictive) ("Comsat Comments"). See also Statement in Partial Support of NTIA Rulemaking of Mobile Communications Holdings, Inc. (filed Dec. 8, 1997) (asserting that "compliance will exact a heavy price upon U.S. systems in terms of increased terminal costs, shorter battery 'talk time,' greater MET size, as well as potentially diminished capacity").

The Commission notes that two Big LEO licensees, Globalstar, as represented by L/Q Licensee, Inc. and Airtouch Satellite Services US, Inc., and Motorola, Inc. support the proposed GLONASS protection limits. NPRM, ¶ 69. However, both of these Big LEO licensees were able to design their METs to comply with the limits. AMSC, Comsat, and Norcom, by contrast, designed and manufactured their METs years before the WG/6, SC-159 Report was released.

GLONASS band by only an insignificant amount by doing so because, at any given moment, only a small fraction of Norcom's METs would be operated close enough to the GLONASS band to create out-of-band emissions in the GLONASS band that exceed the Commission's proposed limits.

The record in this proceeding does not contain any evidence or technical analysis supporting the Commission's proposal, but contains significant technical analysis demonstrating that the proposed limits are unnecessarily restrictive. The MSS representatives involved in the compilation of RCTA's report determined, using a probabilistic analysis and risk assessment, that wide-band and narrow-band out-of-band emission limits of –54 dBW/MHz and –64 dBW, respectively, can be "practically achieved," and "are safe and fully adequate to protect commercial quality [GNSS] navigation receivers for operations in all phases of flight, including [precision landings]."[12] In addition, AMSC, Comsat, and Constellation provided additional technical analysis to the Commission demonstrating that the proposed limits are unnecessarily restrictive.[13] By contrast, no party supporting NTIA's proposal has provided any technical

[12] Appendix E, at 3, 9. Specifically, the MSS community employed a probabilistic analysis to assess the risk of interference to a hypothetical GNSS system (utilizing GPS and GLONASS) used to assist a flight crew during a Category 1 precision approach. In a Category 1 precision approach, the flight crew loses visibility at some point between 200 and 500 feet. The probabilistic analysis concluded that under the out-of-band restrictions proposed by the MSS community, an aircraft will lose its hypothetical GNSS signal for more than five seconds once every 2500 years, assuming 200 million flights per year with every approach being a Category I approach. Appendix E, at 29. According to Appendix E, this is equivalent to one ten millionth of the current acceptable level of risk of loss of a radionavigation signal for a five second interval during an approach. Appendix E, at 6. Loss of a signal for five seconds during a Category I approach may cause a missed approach and require the flight crew to circle around and attempt the landing again. Id.

[13] See AMSC Comments, at 9-12, Comsat Comments, at 7-8; see also Comments of Constellation Communications, Inc., at 3-4 (filed Dec. 8, 1997) (arguing that "protection levels to be afforded for GLONASS should also have a sound technical basis" and that "[t]he NTIA proposal does not meet this requirement").

analysis demonstrating the merits of the proposed limits. In fact, NTIA's three-page Petition requesting enactment of the limits provides absolutely no technical analysis to demonstrate a need for emission limits to prevent interference to GLONASS. The Commission, in turn, has proposed to adopt NTIA's proposed limits without independently analyzing the technical merits of the limits or even whether the limits are necessary.[14]

Moreover, satellite industry analysts have questioned whether GLONASS will be authorized by 2005 for use by commercial aviation. GLONASS is far less reliable than GPS[15] and the Russian Federation has not demonstrated that it is willing or capable of committing the resources necessary to maintain GLONASS.[16] Moreover, the FAA will likely require more than five years to approve the use of GLONASS in the United States and airlines will require

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[14] The NPRM provides no technical analysis regarding the level of interference protection required by GLONASS, but instead relies on the unsupported proposal by the NTIA. See NPRM, ¶ 61 (stating that the proposed limits offer "protection for planned GNSS operations to an extent deemed necessary by the Federal agencies responsible for domestic implementation of the GNSS").

[15] See, e.g., Global Navigation Systems Could Meet Many Needs, RCR Radio Communications Report (Feb. 23, 1998) (noting that "financial and technological bugs" make GLONASS "second-fiddle" to GPS); WAAS Under Fire at ION Annual Meeting, Global Positioning & Navigation News (July 2, 1997) (stating that "the FAA, like the GPS Joint Program Office, do not believe that [GLONASS] is reliable," and quoting an FAA Satellite Navigation Program Office official as stating, "We don't believe GLONASS can be certified for precision approaches."); NAVSAT Market Shows GPS Stability, Military Space (Feb. 3, 1997) ("[T]he technical capability and system architecture of the Russian GLONASS remains less than that of the [GPS].").

[16] During the mid 1990s, several of the GLONASS satellites were not fully operational and the Russian Federation substantially scaled back or scrapped several scheduled GLONASS satellite replacements. Recently, the Russian Federation has been seeking an outside source of financing for the continued operation of GLONASS. See NAVSAT Market Shows GPS Stability, Military Space (Feb. 3, 1997) (describing failure of Russian Federation to adequately maintain GLONASS); EC Proposes New Civil Sat-Nav System, Telecommunications International (April 1, 1999) (arguing that the EU may be able to assist the Russian Federation to fund and operate GLONASS and may thereby eventually gain control of GLONASS); see also View From Europe In Times of War, Satellite Communications (May 30, 1999) (noting that "the problem [with GLONASS], from the western point of view, is the political uncertainty in Russia").

additional time to outfit their fleets with GLONASS-compatible systems and train their flight crews to use the systems. In addition, the European Union is moving towards developing its own radionavigation satellite system, which could ultimately replace GLONASS as a system component of GNSS.[17] Thus, it is unclear when, or even if, GLONASS will be used in the United States for aviation purposes.[18] The Commission should not implement any unnecessarily restrictive out-of-band limits (such as those proposed here) to protect GLONASS until the Commission is able to determine with a greater degree of certainty whether and when GLONASS will be authorized for use in the United States.

IV. THE COMMISSION CAN DRAMATICALLY REDUCE THE BURDEN OF THE PROPOSED EMISSION LIMITS ON NORCOM AND OTHER MSS MET LICENSEES WITHOUT REDUCING THE EFFECTIVENESS OF THE EMISSION LIMITS

By adopting two modifications to its proposed out-of-band emission limits to protect GLONASS, the Commission can substantially alleviate the considerable prejudice that Norcom would suffer under the limits as currently proposed without significantly reducing the effectiveness of the interference protection provided to GLONASS.

First, if the Commission relaxes its proposed limits at the edge of the GLONASS band, Norcom should be able to fully comply with the Commission's limits without burdensome modifications to Norcom's METs. Specifically, Norcom urges the Commission to adopt a

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[17] See UK to Increase ESA Project Commitments, Interspace (May 19, 1999) (stating that EU members have committed sufficient contributions to fund the "initial definition" phase of the Galileo project); UK Seeks Comment on EU's Proposed Galileo Satellite Constellation, Global Positioning & Navigation News (May 5, 1999) (describing the EU's proposal to construct Galileo, a multi-billion dollar 24 to 45 satellites radionavigation system similar to the GLONASS and GPS systems).

[18] NTIA's proposed, restrictive out-of-band emission limits are premised on the need to protect GLONASS against interference for the purpose of the use of GLONASS on aircraft. No party has argued that such strict limits are necessary for any other potential GLONASS application.

linearly sloped wide-band emission limit increasing from –70 dBW/MHz at 1600 MHz to –65 dBW/MHz at 1605 MHz. Norcom also requests the Commission to adopt a narrow-band emission limit of –75 dBW between 1600 MHz and 1605 MHz. Relaxing the emission requirements in a small portion of the edge of the GLONASS band should have no effect on GLONASS operations because it is a spread spectrum system.[19] In addition, these changes to the Commission's proposed limits accommodate the practical realities of pass-band filters, which have some natural slope in their frequency response and are not capable of entirely cutting off out-of-band emissions at an adjacent frequency.

Second, rather than establishing now a date by which MSS METs commissioned for use before January 1, 2002 must comply with the emission limits proposed to protect GLONASS, the Commission should defer establishing this deadline until it is possible to more definitively determine when and if GLONASS will be approved by the FAA for use by commercial aircraft as part of GNSS. The Commission should review in 2002 and every two years thereafter the status of the FAA's review of the suitability of GLONASS for commercial aviation purposes and reconsider at that time the appropriate date by which MSS METs must comply with the limits. In no case should MSS MET licensees be required to comply with restrictive emission limits to protect GLONASS before GLONASS is even authorized by the FAA for use by commercial aircraft.

[19] A key characteristic of spread spectrum systems is their inherent noise immunity. The information content of the RF signal of spread spectrum systems is spread across a wide frequency band, and thus a small increase in the noise floor within a narrow band, such as the upper edge of the future GLONASS band after GLONASS migrates to spectrum below 1606 MHz, will have no adverse effects on the spread spectrum signal.

IV. CONCLUSION

The Commission should not enact its proposed restrictive out-of-band emission limits because, both in terms of timing and magnitude, the limits are not the least restrictive limits capable of protecting GLONASS. Rather, to reduce the financial burden imposed by the limits on Norcom and other incumbent MSS MET licensees, the Commission should relax its emission limits at the upper edge of the post-migration GLONASS band and should not impose any new limits in this band until GLONASS is authorized to be used for commercial aviation purposes in the United States.

Respectfully Submitted,

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Dated: June 21, 1999

DECLARATION OF MIKE VERTAL

I, Mike Vertal, under penalty of perjury, do hereby declare that the following is true, complete and correct:

1. I am the Director of Product Development of Norcom Networks Corporation.
2. I have read and am familiar with the foregoing Comments of Norcom Networks Corporation on the Federal Communications Commission's Notice of Proposed Rulemaking in Rulemaking No. 9165. To the best of my knowledge, information, and belief, the facts contained therein are true and correct.

Mike Vertal

June 21, 1999